

CHAPTER IV

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DISCUSSION

The chapter IV is the elaborate discussion of the previous chapter on results and findings based on the data collected during the tenure. A study was made on the adult population of Tawang on the basis of respiratory function, blood pressure and their nutritional status. An attempt has been made to understand the relationship between respiratory parameters and anthropometric characteristic and also with blood pressure and nutritional status among the adult population of Tawang.

A) Demographic Aspects:

The need of demographic data at the grass root level of any field study is a fundamental part of the research. Demographical data is the data obtained from the certain features of the population such as age, gender, occupation, income level, marital status, etc. It provides the general information regarding research participants. As per the findings, it is observed that an excess of males (506) when compared to female (472) is observed among the Tawang Monpa group. Among the male participants it is interesting to note that with the increase of age there is a gradual decrease in the number of population. But among the females no such trend is been noticed. The sex ratio is 932.81 per 1000 males. More number of married man (64.23%) and women (75%) are found among the total population. It is observed that female (45.34%) illiteracy is more when compared to the males (42.29%) but at

the same time the post graduate females (2.33%) are slightly higher as compared to male (1.78%) participants. Occupationally large number of the population engaged themselves as agriculturist (38.55%). 18.86% of females are housewives. A good per cent of males and females engaged themselves as labourer (18.38%) and (14.83%) respectively. Income level of the families of the participants is an essential part of research work. It is studied to understand the economic status of the respondent. Here the table suggest that highest number of males (47.63%) are in the monthly income level of Rs 15000-25000 and among females (47.88%) in the monthly income level of <15000 . Very few of the males (19.17%) and females (12.08%) are in the monthly income of less than 25000.

B) Respiratory parameters:

Among the total population an excess of males relative to female is observed among the Tawang Monpa. In the respiratory study the number of total males is 239 and the number of females is 215. As the age increases, the number of individuals gradually decreases among the males. Whereas, among the females the number of individuals gradually increases from <20 years to 21-30 years age group. The number of individuals gradually decreases from 31-40 to >60 years age group. It is interesting to note that while, 14 individuals is recorded among the males in >60 years only 9 individuals is recorded among the females in this age group. Highest number of male is found in the age group of below 20 years i.e. 95 (39.75%) while lowest is seen in the age group of above 60 years i.e 14 (5.86%). In the female population highest numbers are seen in the age group of 21-30 years i.e. 70 (32.56%) while lowest is seen in the age group of above 60 years i.e. 9 (4.19%).

The Table III.1 shows the mean age, height, weight, FVC, FEV1 and FEV1/FVC where the male respondents shows a higher mean value 31.07 years, 166.16 cm, 62.32 kg, 2.84, 2.74 and 96.84 respectively when compared to the females (31.78 years, 156.80 cm, 55.63 kg, 2.43, 2.34 and 96.34 respectively).Age-wise mean and S.D of respiratory parameters of both

male and female participants represents that with the increase of age there is a gradual decrease in the mean value apart in the age group of above 60 years. While in case of FEV₁/FVC (%) no such trend of increase or decrease according to age is found.

Regarding the highest mean weight is seen in the age group of 51-60 years (70.05kg), highest mean height in 31-40 (168cm), highest mean BMI is seen in above 60 years (26.42 kg/m²). The lowest mean weight is seen in the category of below 20 years (58.71kg), lowest mean height in above 60 (162.93cm) and BMI in 21-30 (20.83kg/m²) in the male population. Among the female population the highest mean weight, height and BMI are seen in the category above 60 years (70.67kg), in 21-30 years (157.61cm) and in above 60 years (28.73kg/m²) respectively. The lowest mean weight and BMI is seen in the category of below 20 years 50.44 kg and 20.48 kg/m² respectively while lowest mean height in 51-60 (155.18cm).

Both the male and female shows a normal range of FEV₁/FVC ratio i.e. 99.6% and 97.22% respectively as per the normal range classified by American Thoracic Society(80% or greater). It is seen that in the male category highest numbers are in the normal which is 238 (99.6%). And only 1(0.4%) is seen in the moderately abnormal. While no individual are found in the other categories. Whereas majority of the female population are found in the normal range which is 209 (97.22%). A gradual decrease is seen in the ranges. 4 (1.86%) female individuals are seen in the range of mildly abnormal, 1 (0.46%) individual are seen in both moderately abnormal and moderate to severely abnormal. The normal range of respiratory function may be due to their residing in the high altitude region for years. The present study has similarities with the study made by Kapoor et al., (2005) on the body structure and respiratory efficiency among the high altitude Himalayan population. The study states that the forced vital capacity and the ratio of FEV₁/FVC were significantly higher in Ladakhi Bods and Tibetans as compared to lowlanders. The larger lung dimension and

superior lung capacity of Ladakhi Bods and Tibetan could also be attributed to high level of habitual physical activity rendering them better adaptability to low oxygen tension at high altitude. Their type of acclimatory change might be a direct consequence of hyoxaemia during developmental period influencing the growth of their lungs capacity (Kapoor et al., 2005). Similar studies were also made by Frisancho (1979) where the investigations in Ethiopia demonstrated that highlanders living above 3000 meters have a significant greater forced vital capacity than their lower altitude counterparts. The enlarged lung volume of the high-altitude native results from adaptations acquired during the development period. This study also resembles to the work done by Wu et al., (2006) on the high altitude adaptation in Tibetans where the study reveals that the Tibetans ventilatory responsiveness, larger lungs and better lung function than the Low Landers.

Blood pressure parameter

Anthropological data of the study reveals that there are total 524 adult participants of which an excess of males (50.95%) were found in comparison to females (49.05%) participants. The mean age of the population is 36.58 years where males (37.6 years) and females (35.5years). Similarly the population shows a mean value of height, weight, systolic and diastolic blood pressure is 159.64 cm, 64.65 kg, 126.57 mmHg and 84.05 mmHg respectively. The male shows a higher mean value of all the parameters as compared to females apart from mean value of BMI where female participants shows a higher BMI mean than the male participants. Highest number of male is found in the age group of below 21-30 years i.e. 70 (26.22%) while lowest is seen in the age group of above 60 years i.e. 15 (5.62%) While among the female population highest numbers are seen in the age group of 21-30 years i.e. 94 (36.58%) while lowest is seen in the age group of above 60 years i.e. 14 (5.45%). Blood pressure level is classified according to Joint National Committee 8th Classification of hypertension. More than 62 percent of the males and 65 percent of the females have Pre-

hypertension, while more than 27 percent of the males and 19 per cent of the females have Stage 1 hypertension. And more than 3 percent of the males and 2 percent of the females have Stage 2 Hypertension. Thus, hypertension occurs in higher percent in the males than that of the females. Of the total population more than 61 % of them are categorized in the prehypertension level.

It is seen that with the increase of age there is a gradual increase in the mean systolic and diastolic blood pressure among the females while among the male participants fluctuation of mean value of both systolic and diastolic blood pressure is found. The earlier study of Aliyu (2014) also shows that the mean systolic and diastolic blood pressure of the male participants is higher than the female participants, which has also a clear resemblance of the present study on the Tawang population. Here the mean systolic and diastolic blood pressure was found to be higher in male participant (128.8 mmHg) and (85.09 mmHg respectively) than their female counterparts (124.26 mmHg) and (82.98 mmHg) respectively. Among the females the highest mean weight is seen in the category 41-50 (65.62 kg), highest mean height in <20 (155.55 cm), highest mean systolic, diastolic and BMI in seen <60 (137.29 mmHg) and (90.14 mmHg) and (28.08Kg/m²) respectively. The lowest mean weight is seen in the category <20(56.22 kg), lowest mean height in >60 (151.59 cm), lowest mean systolic, diastolic and BMI in seen <20 (120.17 mmHg) and (79.57mmHg) and (23.23Kg/m²) respectively. While among the males the highest mean weight and height is seen in the category 41-50(73.19 kg) and (166.28 cm), highest mean systolic, diastolic and BMI is seen in 51-60 (133.53 mmHg) and (88.37 mmHg) respectively and highest mean BMI in 41-50 (26.42 kg/m²). The lowest mean weight is seen in the category <20 (59.13 kg), lowest mean height in <60(161.22 cm), lowest mean systolic, diastolic and BMI in seen <20 (120.26 mmHg) and (78.84 mmHg) and (21.86 Kg/m²) respectively.

C) Nutritional status:

Body composition among the adults to some extent reveals the nutritional status of the population. Many studies have shown that an increase in BMI and WHR leads to the risk of many disease and disability in people over the age of 60 (Milanovic et al., 2011). The study is made on the basic anthropometric and body composition characteristics in an adult population. The mean age of the population is 36.58 years where males (37.6 years) and females (35.5years) indicate a young adult population which is resemblance to the study of Banik, 2008 on the nutritional status of adult male of Jharkhand. With the males having a higher mean height of (165.3 cm) and weight (68.28 kg) than the mean height (153.76 cm) and weight (60.87kg) of their female counterparts which is similar to the study of made by Aliyu et al., 2014 where the mean height and weight of males exceeds that of the females. The assessment to measure central obesity is often done using body mass index, waist circumference, waist to hip ratio, waist to height ratio and conicity index (Browning et al., 2010; Shidfar et al., 2012; WHO, 1995a, 2000a, 2000b, 2004, 2011b) . The cut-offs for assessing the nutritional status of the population was based on the World health Organization (WHO, 1995a, 2000a, 2000b, 2004, 2011b) classification of Asian populations. On the basis of this classification, the results obtained from the findings showed significant differences especially in classifying the normal and obese categories. With similarities to the study of Aliyu et al., 2014 the mean BMI of the female participants (25.72 kg/m²) was found to be higher than the mean BMI of the male participants (24.94 kg/m²). Result shows that among the male population with the increase of age there is a gradual increase in mean weight and waist circumference. While a gradual decline in the mean height and waist circumference is seen from the age group of 41-50 years among the same sex. Whereas among the females the mean weight and height shows a fluctuation when compared to age, while mean waist and hip circumference shows a gradual increase with the increase of age. Based on the BMI

classification of the Asian population, it was found that the overall prevalence of obesity was significantly high in the studied population. Findings suggest that all almost 50% of the total population is obese of which males (47.19%) and females (52.14%), followed by 27.86% are normal weight of which 29.59% males and 26.07% are females. More than 19% of the total population is overweight. A very low percent of the population are in the underweight category 3.05%. The present study also suggests that the trend of obesity was more prevalent among the females than the males. Hence the study reveals the trend of obesity among the Tawang Monpas. These shows similarities with the study of Kapoor et al., (2005) on highlander natives of Himalayan region where the study reveals that the high altitude natives were more robust as compared to lowlanders on the basis of their BMI values. Age wise distribution of the categories of BMI reveals that among the male categories highest number in the age group of 41-50 (12.73%) in the obese category. While among the females (16.73%) highest numbers are seen in the age group of 31-40 in the obese category. From the above tables it can be interpret that among both the male and female participants maximum of them are obese, followed by normal weight and then occupied by overweight category. Very least numbers are found in the underweight category in both the population group. Regarding stature highest number of male are medium statured (21.72%) and among females in lower medium statured (25.68%). Again only (0.37%) males are in the range of very tall and among females only (0.78%) occupies the very tall range.

In the present study an attempt has been made to classify the population in terms of central obesity. Abdominal obesity also known as central obesity is the occurrence of excessive abdominal fat around the stomach. The excessive fat in the abdominal area of the stomach likely to have negative impact on health related issues. Therefore the present study highlight the effects of waist circumference, waist to hip ratio, waist to height ratio and conicity index on the central obesity of the population. Waist circumference is a better

indicator of obesity among the elderly than the BMI (Milanovic et al., 2011). The central obesity on the basis of waist circumference represents that the prevalence of central obesity is much higher in women (82.10%) than man (51.69%). The waist circumference and waist to hip ratio significantly increased in the elder than the younger women which is similar to the study of Milanovic et al., (2011) but a slight fluctuation is found among the male population. Much variation is observed among the female participants. The prevalence of central obesity in waist to hip ratio and waist to height ratio is much higher in women (96.11%) than man (87.27%) and women (89.88%) than man (86.14%) respectively. In all the age group the mean value of waist to height ratio of both male and female are above the normal range. The results of waist to height ratio also suggest that most of the male and the female population are found in the obese category 230 (86.14%) and 231 (89.88%) respectively. Here also it is seen that the prevalence of central obesity in waist to height ratio is higher in women (89.88%) than man (86.14%). Regarding conicity index among the males it is seen that with the increase of quartile there is an increase in the number of male participants. While a slight fluctuation is observed among the females. The results on the findings of central obesity on the basis of W.C, WHR, WHtR and conicity index suggest a marked prevalence of obesity in the population is indeed a cause of serious concern. The study also showed that the prevalence of central obesity was found to be higher in females than males.

There is a significant correlation between BMI and other parameters like weight, height, waist circumference, hip circumference, WHR, WHtR and conicity index. It is seen that in the male population there is a positive and significant correlation between weight, height, waist circumference, hip circumference, WHR and WHtR but a negative and significant correlation was observed between BMI and conicity index. While in case of female population there seems to be a positive and significant correlation between BMI and all the variables.

D) Correlation between respiratory parameters and BMI:

Body mass index (BMI) has always been considered as the best variables for the anthropometric evaluation in nutritional and the general health screening (Mungreiphy et al., 2012). The relationship between obesity and respiratory function is poorly understood (Sutherland et al., 2016). The study evaluates the association of pulmonary function parameters with the anthropometric parameters of both the male and female participants.

The mean values for age, height, weight and BMI for males are 31.07 years, 166.16 cm, 62.32 kg and 22.56 kg/m² and for females are 31.78 years, 156.80 cm, 55.63 kg and 22.68 kg/m². BMI distribution among the participants shows that highest numbers of participants are seen in the normal weight category, male (39.75%) and female (34.42%). While least numbers are seen in the overweight category- male (22.59%) and female 27(12.56). The table VI.2 and VI.3 shows the distribution of FVC, FEV1 and FEV1/FVC of male and female participants in different BMI categories. It is seen that in the underweight category mean value of BMI, FVC, FEV1 and FEV1/FVC are 16.08, 2.73, 2.68 and 97.97 respectively. In the normal weight category mean value of BMI, FVC, FEV1 and FEV1/FVC are 20.98, 2.95, 2.86 and 96.97 respectively. In the overweight category mean value of BMI, FVC, FEV1 and FEV1/FVC are 24.07, 2.79, 2.65 and 95.70 respectively. In the obese category value of BMI, FVC, FEV1 and FEV1/FVC are 28.13, 2.77, 2.68 and 97.01 respectively. Whereas among the female participants in the underweight category mean value of BMI, FVC, FEV1 and FEV1/FVC are 16.93, 2.42, 2.38 and 98.32 respectively. In the normal weight category mean value of BMI, FVC, FEV1 and FEV1/FVC are 20.97, 2.43, 2.36 and 97.42 respectively. In the overweight category mean value of BMI, FVC, FEV1 and FEV1/FVC are 23.94, 2.52, 2.36 and 94.03 respectively. In the obese category mean value of BMI, FVC, FEV1 and FEV1/FVC are 27.94, 2.40, 2.28 and 94.75 respectively.

The table VI.5 and VI.6 shows the distribution of FEV1/FVC in accordance with BMI. Among the male participants in the underweight category there are total 36 participants of which highest number of them are found in the normal range 35 (14.64%) and 1 (0.42%) is in the moderately abnormal range group. It is seen that in the normal weight, overweight and obese total participants are found in the normal range of FEV1/FVC i.e. 95 (39.75%), 54 (22.59%) and 54 (22.59%) respectively. In the underweight and normal category 46(21.40%) and 74 (34.42%) participants respectively are found in the normal range. Followed by 68 participants in the obese category of which 65 (30.23%) are in normal range, 1 (0.47%) in mildly abnormal, moderately abnormal as well as in moderate to severely abnormal category. Least participants are found in the overweight category of a total of 27 of which 24 (11.16%) are in the normal range and 3 (1.40%) in mildly abnormal range. Therefore it can be said that both the male and the female population have normal range of FEV1/FVC ratio in all the categories of BMI classification.

It is seen that there is a positive and significant correlation between weight and BMI of both male and female population while a negative correlation is seen in between the height and BMI of the group. The study shows that the correlation between BMI and respiratory parameters suggest that among the female participants there is a negative and significant correlation between BMI and the respiratory parameters (FVC, FEV1 and FEV1/FVC). This study shows similarities with the study made by Mungreiphy et al., (2012) among the Tangkhul Nagas where BMI showed negative correlation with FEV1 and FVC. While among the males it is seen that there exist a negative and significant correlation between BMI and FEV1 and FEV1/FVC but at the same time it is also seen that a positive and significant correlation exist in between BMI and FVC. Ubilla et al. (2008) also found consistent evidence in males and females that BMI are negatively associated with FEV1 and FVC in comparison to BMI. BMI as a composite measure of lean and fat tissues may not provide a

single explanation for its relation with FVC, FEV1 and FEV1/FVC (Mungreiphy et al., 2012).

Study reveals that a positive correlation exists between height and weight with FVC and FEV1 among the male population. While a negative correlation exist between height and weight with FEV1/FVC in the same sex. Whereas in the female population there exist a positive correlation between height with FVC, FEV1 and FEV1/FVC and weight with FVC. But a negative correlation is seen in between weight and FEV1 and FEV1/FVC. Regarding the correlation between age and other parameters like weight, height, BMI, FVC, FEV1 and FVC/FEV1. It is seen that in the male population there is a positive and significant correlation between weight, height, BMI and FEV1/FVC but a negative and significant correlation was observed between age and FVC and FEV1/FVC. While in case of female population there seems to be a positive and significant correlation between age, weight and BMI but a negative and significant correlation is observed between age and height, age and FVC, FEV1 and age and FEV1/FVC. It has similarities with the study made by Mungreiphy et al., 2012 where Pearson correlations showed that both age and BMI had negative association with respiratory parameters among the Tangkhul Nagas but there exist a positive correlation between age and BMI. The study has also resemblance with Kapoor et al., 2008 where the author has also drew a negative and significant correlation between age and respiratory parameters.

E) Relationship between blood pressure and nutritional status

The study reveals that minimum mean systolic and diastolic BP was found in underweight category whereas maximum were found in obese category. In the present study it is observed that 47.19% male are in obese category of BMI in comparison to female (52.14%). It is seen that in both male and female members minimum mean S.B.P were found in the normal weight category (124.81 mmHg) and (120.84 mmHg) respectively and the

maximum mean S.B.P were found among the obese category (131.86 mmHg) and (126.99 mmHg) respectively. While minimum mean D.B.P were found in the normal weight category (82.59 mmHg) for male and in over weight category (81.46 mmHg) for female participants. Again maximum mean diastolic BP were found in the obese category for both male and female (86.94 mmHg) and (84.36 mmHg) respectively. The result though not statistically tested showed that mean systolic and diastolic blood pressure increases with increasing BMI level among the participants. The present study has some similarities with the cross-sectional study made by Kundu et al., (2014) on the 'The relationship of blood pressure and obesity among adult Bengalee male of North 24 Parganas, West Bengal where the study says that with the increase of BMI status there is a significant increase in both systolic and diastolic blood pressure.

The distribution of BMI in various ranges of blood pressure level shows that the highest numbers of male are in the obese category 126, out of which 63 (23.60%) individuals belongs to the pre hypertension group followed by 48 (17.98%) in Stage I hypertension , 8 (3%) in stage II hypertension and remaining 7 (2.60%) in normal category And the lowest participants in the underweight category i.e. 8 where 5 (1.87%) individual occur in pre hypertension, 2 (0.75%) in normal range and 1 (0.37%) in stage I hypertension. Whereas among the females it is seen that highest numbers of in the obese category 134 (52.14%), out of which 76 (29.57%) individuals belongs to the prehypertension group followed by 40 (15.56%) in Stage II hypertension, 13 (5.06%) in normal range and remaining 5 (1.95%) in stage II hypertension. And the lowest participants in the underweight category i.e. 8 where 7 (2.72%) individual occur in pre hypertension and only 1 (.339%) in normal range.

The association between BMI and blood pressure (both S.B.P and D.B.P) parameters suggest that a positive and significant correlation exist in between the two parameters in both the population group. This has close resemblance with the study of Aliyu et al., 2014 which

revealed that there is significant correlation between BMI and BP (S.B.P and D.B.P) among the university students in Maiduguri, Nigeria. Positive relationship between BMI and BP has also been reported among the Asian populations (Kapoor 2000; Mungreiphy et al., 2011). The relationship between these two parameters has always been the subject of epidemiological research. Regarding waist circumference it is observed in the normal waist circumference that most of the male are present in prehypertension stage 89 (33.33%) and only 1 (0.37%) is found in the stage II hypertension. While of the total 46 numbers of females 35 (13.62%) numbers are found in prehypertension stage. Similarly in the obese category 78 (29.21%) numbers of male and 133 (51.75%) numbers of female are observed in prehypertension stage. While least numbers of male 9 (3.37%) and females 7 (2.72%) are found in the stage II hypertension. Also waist circumference and BP (S.B.P and D.B.P) are positively and significantly correlated. There is a positive and significant correlation between waist circumference with systolic and diastolic blood pressure for both the male and female population.

Again in waist to hip ratio it is observed that in the normal WHR most of the male are present in prehypertension stage 21 (7.87%). While among the females 6 (2.33%) numbers are found in prehypertension stage. No individuals are found in the stage II hypertension. Similarly in the obese category 146 (54.68%) numbers of male and 162 (63.04%) numbers of female are observed in prehypertension stage. While least numbers of male i.e. 10 (3.75%) and females 7 (2.72%) are found in the stage II hypertension. There is a positive and significant correlation between waist to hip ratio with systolic and diastolic blood pressure for both the male and female population. The table VII.11 shows the distribution of the categories of blood pressure according to the ranges of waist to height ratio (WHtR) for both the population. It is seen that in the normal WHtR most of the male are present in prehypertension stage 24 (8.99%). While among the females 21 (8.17%) numbers are found in prehypertension stage. No individuals are

found in the stage II hypertension. Similarly in the obese category 143 (53.56%) numbers of male and 147 (57.20%) numbers of female are observed in prehypertension stage. While least numbers of male i.e. 10 (3.75%) and females 7 (2.72%) are found in the stage II hypertension. The study shows that there is a positive and significant correlation between waist to height ratio with systolic and diastolic blood pressure for both the male and female population. Regarding conicity index and B.P there is a negative correlation between conicity index with systolic and diastolic blood pressure for the male population. While in case of female population it is quite different. Here it shows a positive and significant correlation between the conicity index and systolic as well as diastolic blood pressure.

The correlation between age and other parameters like weight, height, waist circumference, hip circumference BMI, WC, WHR, WHtR, conicity index, systolic blood pressure and diastolic blood pressure shows that in both the population there is a positive and significant correlation between age and all the other parameters besides height. In both male and female population there is a negative correlation between age and height.